

Leon Balents

Kavli Institute of Theoretical Physics
University of California
Santa Barbara, CA 93106 U.S.A.

Phone: 805-893-6381

Email: balents@kitp.ucsb.edu

URL: <https://spinsandelectrons.com/>

Born: July 24, 1967—New Jersey, USA
Nationality: American

Current position

Professor and Permanent Member, Kavli Institute for Theoretical Physics, UCSB

Areas of specialization

Theoretical condensed matter physics

Appointments held

1994-1998	ITP Research Fellow, ITP, Santa Barbara
1998-1999	Member of Technical Staff, Bell Laboratories, Lucent Technologies
1999-2001	Assistant Professor of Physics, UC Santa Barbara
2001-2002	Associate Professor of Physics, UC Santa Barbara
2002-present	Professor of Physics, UC Santa Barbara
2008-present	Permanent Member, Kavli Institute for Theoretical Physics, UCSB

Education

1989	SB in Physics and Mathematics, Massachusetts Institute of Technology
1994	PhD in Physics, Harvard University

Grants, honors & awards

2000	Alfred P. Sloan Fellowship
2000	David and Lucile Packard Fellowship
2000	NSF Career Award
2013	APS Fellowship
2017	Welsh lecturer, University of Toronto
2017	Pat and Joe Yzurdiaga chair in theoretical physics
2018	Elected member of the American Academy of Arts and Sciences
2019	APS Outstanding referee

Service to the profession

2007	Coauthor, BESAC report on Grand Challenges in Basic Energy Sciences
2007-2009	Member, ICAM science steering committee
2009-2010	Member, Program Committee for HFM2010 conference
2009-2011	Molecular and Materials Science Evaluation Committee, TRIUMF
2009-present	Contributing Member, Journal Club for Condensed Matter Physics
2010-2011	Member, International Advisory Board for LT26 conference
2010-2012	Member, advisory committee of Princeton Center for Complex Materials
2011-2012	Co-chair, Program Committee for HFM2012 conference
2011-2012	Member, IPhT Evaluation Committee, Saclay, France
2012	Member, International Review Panel for CIFAR Quantum Materials Program
2012-present	Program co-chair, International Conference in Magnetism, (San Francisco, 2018).
2013	Member, APS Buckley Prize Committee
2013-2014	Member, International Advisory Board for LT27 conference
2013-present	Foreign Associate, CIFAR Quantum Materials program.
2014-present	Distinguished Visiting Research Chair, Perimeter Institute for Theoretical Physics.
2015-2016	Member, International Advisory Board for LT28 conference
2015-present	Member, advisory board for IQM, Johns-Hopkins University
2015-present	Member, Fine Theoretical Physics Institute Oversight Board
2015-present	Member, Science Review Committee for Neutron Sciences at ORNL
2016-present	Member, External Advisory Committee for Princeton Center for Complex Materials
2018	Organizing committee member for biennial conference on <i>Highly Frustrated Magnetism</i> , Davis CA
2018	Program co-chair for biennial <i>International Conference on Magnetism</i> , San Francisco, CA
2018-	Member at large, APS Division of Condensed Matter Physics executive committee
2019	Member, program committee for LT29 conference

Major workshops organized

2007	KITP Program on <i>Moments and Multiplets in Mott Materials</i>
2008	Chair, Gordon Research Conference on <i>Correlated Electron Systems</i>
2012	Aspen workshop on <i>Spin-Orbit Physics in Correlated Electron Systems</i>
2013	KITP Program on <i>Spintronics: Progress in Theory, Materials, and Devices</i>

2016 Laguna Beach conference on *Intertwined Orders in Strongly Correlated Systems*

Public lectures

- 2014 “[Particles, Quasi-particles, and beyond](#)”, Maggie and Nick DeWolf public lecture, Wheeler Opera House, Aspen, CO
- 2016 “[Strange stuff: a second quantum revolution](#)”, lecture associated with the Boulder summer school on condensed matter physics, Boulder, CO
- 2017 “[Strange stuff: a second quantum revolution](#)”, H.L. Welsh lecture in physics, University of Toronto.
- 2018 “[Magical magnetism and other strange stuff](#)”, Yzurdiaga Chair inauguration lecture, KITP, UCSB.

Courses at advanced physics schools

- 2008 “Frustrated Magnetism”, Boulder summer school for condensed matter and materials physics, 2008.
- 2009 “Frustrated Magnetism”, ICTS Winter School, Mahabaleshwar, India, December 2009.
- 2013 “Topological insulators and their implications”, MANEP 2013 school, Les Diablerets, Switzerland, June 2013.
- 2013 “Frustration, structure, and symmetry of interactions”, 12th annual PSI summer school, Zuoz, Switzerland, August 2013.
- 2016 “Quantum spin liquids”, CIFAR quantum materials school, April 2016.
- 2016 “Quantum spin liquids”, Boulder summer school for condensed matter and materials physics, July 2016.
- 2018 “Introduction to Quantum Materials,” QS3 summer school, Cornell, June 2018.
- 2018 “Quantum spin liquids, Majorana edge modes, and thermal Hall”, EPiQM summer school, Cornell, June 2018.

other Invited talks

- 2016- Please see the list at <https://spinsandelectrons.com/talks/>
- 2004-2016 Earlier talks are shown at <http://gabriel.physics.ucsb.edu/balents/talks.html>

Publications

- [1] L. Balents and M. Kardar, “Directed paths on percolation clusters”, *Journal of Statistical Physics*, **67**: 1–11 (1992).
- [2] L. Balents and M. Kardar, “Roughening of anisotropically reconstructed surfaces and the hubbard-model”, *Physical Review B*, **46**: 16031–16044 (1992).
- [3] L. Balents, R. D. Kamien, P. Ledoussal, and E. Zaslow, “On the isotropic-nematic transition for polymers in liquid-crystals”, *Journal de Physique I*, **2**: 263–272 (1992).
- [4] L. Balents and M. Kardar, “A system of n -interacting fermions and its unusual $n \rightarrow 0$ limit”,

Nuclear Physics B, **393**: 480–494 (1993).

- [5] L. Balents, “Localization of elastic layers by correlated disorder”, *Europhysics Letters*, **24**: 489–494 (1993).
- [6] L. Balents and M. Kardar, “Delocalization of flux lines from extended defects by bulk randomness”, *Europhysics Letters*, **23**: 503–509 (1993).
- [7] L. Balents and D. S. Fisher, “Large- n expansion of $(4-\epsilon)$ -dimensional oriented manifolds in random-media”, *Physical Review B*, **48**: 5949–5963 (1993).
- [8] L. Balents and M. Kardar, “Disorder-induced unbinding of a flux-line from an extended defect”, *Physical Review B*, **49**: 13030–13048 (1994).
- [9] L. Balents and D. R. Nelson, “Fluctuations and intrinsic pinning in layered superconductors”, *Physical Review Letters*, **73**: 2618–2621 (1994).
- [10] L. Balents and M. P. A. Fisher, “Temporal-order in dirty driven periodic media”, *Physical Review Letters*, **75**: 4270–4273 (1995).
- [11] L. Balents and S. H. Simon, “Problems with the vortex-boson mapping in $1+1$ dimensions”, *Physical Review B*, **51**: 15610–15612 (1995).
- [12] L. Balents and S. H. Simon, “Commensurability effects in large josephson-junctions”, *Physical Review B*, **51**: 6515–6525 (1995).
- [13] L. Balents and D. R. Nelson, “Quantum smectic and supersolid order in helium films and vortex arrays”, *Physical Review B*, **52**: 12951–12968 (1995).
- [14] L. Balents and L. Radzihovsky, “Continuous 3D freezing transition in layered superconductors”, *Physical Review Letters*, **76**: 3416–3419 (1996).
- [15] L. Balents and M. P. A. Fisher, “Chiral surface states in the bulk quantum Hall effect”, *Physical Review Letters*, **76**: 2782–2785 (1996).
- [16] L. Balents, J. P. Bouchaud, and M. Mezard, “The large scale energy landscape of randomly pinned objects”, *Journal de Physique I*, **6**: 1007–1020 (1996).
- [17] L. Balents, “Spatially ordered fractional quantum Hall states”, *Europhysics Letters*, **33**: 291–296 (1996).
- [18] L. Balents and M. P. A. Fisher, “Weak-coupling phase diagram of the two-chain Hubbard model”, *Physical Review B*, **53**: 12133–12141 (1996).
- [19] L. W. Chen, L. Balents, M. P. A. Fisher, and M. C. Marchetti, “Dynamical transition in sliding charge-density waves with quenched disorder”, *Physical Review B*, **54**: 12798–12806 (1996).
- [20] C. Kane, L. Balents, and M. P. A. Fisher, “Coulomb interactions and mesoscopic effects in carbon nanotubes”, *Physical Review Letters*, **79**: 5086–5089 (1997).
- [21] S. Cho, L. Balents, and M. P. A. Fisher, “Transport of surface states in the bulk quantum Hall effect”, *Physical Review B*, **56**: 15814–15821 (1997).
- [22] E. Frey and L. Balents, “Critical behavior of the supersolid transition in Bose-Hubbard models”, *Physical Review B*, **55**: 1050–1067 (1997).
- [23] L. Balents, M. C. Marchetti, and L. Radzihovsky, “Moving glass phase of driven lattices: Comment”, *Physical Review Letters*, **78**: 751–751 (1997).
- [24] L. Balents, M. P. A. Fisher, and M. R. Zirnbauer, “Chiral metal as a ferromagnetic super spin chain”, *Nuclear Physics B*, **483**: 601–636 (1997).
- [25] L. Balents and M. P. A. Fisher, “Correlation effects in carbon nanotubes”, *Physical Review B*, **55**: 11973–11976 (1997).
- [26] L. Balents and M. P. A. Fisher, “Delocalization transition via supersymmetry in one di-

- mension”, *Physical Review B*, **56**: 12970–12991 (1997).
- [27] H. H. Lin, L. Balents, and M. P. A. Fisher, “N-chain Hubbard model in weak coupling”, *Physical Review B*, **56**: 6569–6593 (1997).
 - [28] L. Balents, M. C. Marchetti, and L. Radzihovsky, “Nonequilibrium steady states of driven periodic media”, *Physical Review B*, **57**: 7705–7739 (1998).
 - [29] L. Balents, M. P. A. Fisher, and C. Nayak, “Nodal liquid theory of the pseudo-gap phase of high-T-c superconductors”, *International Journal of Modern Physics B*, **12**: 1033–1068 (1998).
 - [30] H. H. Lin, L. Balents, and M. P. A. Fisher, “Exact SO(8) symmetry in the weakly-interacting two-leg ladder”, *Physical Review B*, **58**: 1794–1825 (1998).
 - [31] T. Senthil, M. P. A. Fisher, L. Balents, and C. Nayak, “Quasiparticle transport and localization in high-T-c superconductors”, *Physical Review Letters*, **81**: 4704–4707 (1998).
 - [32] Marc Bockrath, David H Cobden, Jia Lu, Andrew G Rinzler, Richard E Smalley, Leon Balents, and Paul L McEuen, “Luttinger-liquid behaviour in carbon nanotubes”, *Nature*, **397**: 598 (1999).
 - [33] L. Balents, M. P. A. Fisher, and C. Nayak, “Dual order parameter for the nodal liquid”, *Physical Review B*, **60**: 1654–1667 (1999).
 - [34] Z. Yao, H. W. C. Postma, L. Balents, and C. Dekker, “Carbon nanotube intramolecular junctions”, *Nature*, **402**: 273–276 (1999).
 - [35] L. Balents and C. M. Varma, “Ferromagnetism in doped excitonic insulators”, *Physical Review Letters*, **84**: 1264–1267 (2000).
 - [36] L. Balents, “X-ray-edge singularities in nanotubes and quantum wires with multiple subbands”, *Physical Review B*, **61**: 4429–4432 (2000).
 - [37] A. L. Moustakas, H. U. Baranger, L. Balents, A. M. Sengupta, and S. H. Simon, “Communication through a diffusive medium: Coherence and capacity”, *Science*, **287**: 287–290 (2000).
 - [38] L. Balents, “Excitonic order at strong coupling: Pseudospin, doping, and ferromagnetism”, *Physical Review B*, **62**: 2346–2357 (2000).
 - [39] L. Balents, M. P. A. Fisher, and C. Nayak, “Dual vortex theory of strongly interacting electrons: A non-Fermi liquid with a twist”, *Physical Review B*, **61**: 6307–6319 (2000).
 - [40] L. Balents and R. Egger, “Spin transport in interacting quantum wires and carbon nanotubes”, *Physical Review Letters*, **85**: 3464–3467 (2000).
 - [41] L. Balents and L. Radzihovsky, “Interlayer tunneling in double-layer quantum Hall pseudoferrromagnets”, *Physical Review Letters*, **86**: 1825–1828 (2001).
 - [42] L. Balents and R. Egger, “Spin-dependent transport in a Luttinger liquid”, *Physical Review B*, **64**: 035310 (2001).
 - [43] C. Bena, S. Vishveshwara, L. Balents, and M. P. A. Fisher, “Measuring fractional charge in carbon nanotubes”, *Journal of Statistical Physics*, **103**: 429–440 (2001).
 - [44] A. Paramekanti, L. Balents, and M. P. A. Fisher, “Ring exchange, the exciton Bose liquid, and bosonization in two dimensions”, *Physical Review B*, **66**: 054526 (2002).
 - [45] M. Y. Veillette and L. Balents, “Weak ferromagnetism and excitonic condensates”, *Physical Review B*, **65**: 014428 (2002).
 - [46] D. Carpentier and L. Balents, “Field theory for generalized Shastry-Sutherland models”, *Physical Review B*, **65**: 024427 (2002).
 - [47] C. Bena, S. Vishveshwara, L. Balents, and M. P. A. Fisher, “Quantum entanglement in carbon nanotubes”, *Physical Review Letters*, **89**: 037901 (2002).

- [48] L. Balents, M. P. A. Fisher, and S. M. Girvin, “Fractionalization in an easy-axis Kagome antiferromagnet”, *Physical Review B*, **65**: 224412 (2002).
- [49] C. Bena and L. Balents, “Spin transport in a quantum wire”, *Physical Review B*, **65**: 115108 (2002).
- [50] S. Vishveshwara, C. Bena, L. Balents, and M. P. A. Fisher, “Andreev current in finite-size carbon nanotubes”, *Physical Review B*, **66**: 165411 (2002).
- [51] M. Y. Veillette, L. Balents, and M. P. A. Fisher, “Quasiparticles in the III state and its compressible ancestors”, *Physical Review B*, **66**: 155401 (2002).
- [52] D. Carpentier, C. Peca, and L. Balents, “Momentum-resolved tunneling between Luttinger liquids”, *Physical Review B*, **66**: 153304 (2002).
- [53] L. Balents and A. Paramekanti, “XY ring-exchange model on the triangular lattice”, *Physical Review B*, **67**: 134427 (2003).
- [54] A. A. Burkov and L. Balents, “Anomalous Hall effect in ferromagnetic semiconductors in the hopping transport regime”, *Physical Review Letters*, **91**: 057202 (2003).
- [55] C. S. Peca, L. Balents, and K. J. Wiese, “Fabry-Perot interference and spin filtering in carbon nanotubes”, *Physical Review B*, **68**: 205423 (2003).
- [56] D. N. Sheng, L. Balents, and Z. Q. Wang, “Phase diagram for quantum Hall bilayers at $\nu=1$ ”, *Physical Review Letters*, **91**: 116802 (2003).
- [57] J. Alicea, C. Bena, L. Balents, and M. P. A. Fisher, “Charge accumulation on a Luttinger liquid”, *Physical Review B*, **69**: 155332 (2004).
- [58] C. Bena and L. Balents, “Spin pumping and magnetization dynamics in ferromagnet-Luttinger liquid junctions”, *Physical Review B*, **70**: 245318 (2004).
- [59] M. Y. Veillette, C. Bena, and L. Balents, “Spin precession and oscillations in mesoscopic systems”, *Physical Review B*, **69**: 075319 (2004).
- [60] M. Hermele, M. P. A. Fisher, and L. Balents, “Pyrochlore photons: The $\text{U}(1)$ spin liquid in a $S=1/2$ three-dimensional frustrated magnet”, *Physical Review B*, **69**: 064404 (2004).
- [61] A. Vishwanath, L. Balents, and T. Senthil, “Quantum criticality and deconfinement in phase transitions between valence bond solids”, *Physical Review B*, **69**: 224416 (2004).
- [62] A. W. Sandvik, L. Balents, and D. K. Campbell, “Ground state phases of the half-filled one-dimensional extended Hubbard model”, *Physical Review Letters*, **92**: 236401 (2004).
- [63] A. A. Burkov and L. Balents, “Spin relaxation in a two-dimensional electron gas in a perpendicular magnetic field”, *Physical Review B*, **69**: 245312 (2004).
- [64] L. Balents and P. Le Doussal, “Broad relaxation spectrum and the field theory of glassy dynamics for pinned elastic systems”, *Physical Review E*, **69**: 061107 (2004).
- [65] T. Senthil, A. Vishwanath, L. Balents, S. Sachdev, and M. P. A. Fisher, “Deconfined quantum critical points”, *Science*, **303**: 1490–1494 (2004).
- [66] L. Balents and P. Le Doussal, “Field theory of statics and dynamics of glasses: Rare events and barrier distributions”, *Europhysics Letters*, **65**: 685–691 (2004).
- [67] G. A. Fiete and L. Balents, “Green’s function for magnetically incoherent interacting electrons in one dimension”, *Physical Review Letters*, **93**: 226401 (2004).
- [68] T. Senthil, L. Balents, S. Sachdev, A. Vishwanath, and M. P. A. Fisher, “Quantum criticality beyond the Landau-Ginzburg-Wilson paradigm”, *Physical Review B*, **70**: 144407 (2004).
- [69] O. A. Starykh and L. Balents, “Dimerized phase and transitions in a spatially anisotropic square lattice antiferromagnet”, *Physical Review Letters*, **93**: 127202 (2004).

- [70] D. N. Sheng and L. Balents, “Numerical evidences of fractionalization in an easy-axis two-spin Heisenberg antiferromagnet”, *Physical Review Letters*, **94**: 146805 (2005).
- [71] L. Balents, L. Bartosch, A. Burkov, S. Sachdev, and K. Sengupta, “Putting competing orders in their place near the Mott transition. II. The doped quantum dimer model”, *Physical Review B*, **71**: 144509 (2005).
- [72] L. Balents, L. Bartosch, A. Burkov, S. Sachdev, and K. Sengupta, “Putting competing orders in their place near the Mott transition”, *Physical Review B*, **71**: 144508 (2005).
- [73] L. Balents and M. P. A. Fisher, “Roton Fermi liquid: A metallic phase of two-dimensional electrons”, *Physical Review B*, **71**: 085119 (2005).
- [74] L. Balents and P. Le Doussal, “Thermal fluctuations in pinned elastic systems: field theory of rare events and droplets”, *Annals of Physics*, **315**: 213–303 (2005).
- [75] J. Alicea, L. Balents, M. P. A. Fisher, A. Paramekanti, and L. Radzihovsky, “Transition to zero resistance in a two-dimensional electron gas driven with microwaves”, *Physical Review B*, **71**: 235322 (2005).
- [76] A. A. Burkov and L. Balents, “Superfluid-insulator transitions on the triangular lattice”, *Physical Review B*, **72**: 134502 (2005).
- [77] O. A. Starykh, A. Furusaki, and L. Balents, “Anisotropic pyrochlores and the global phase diagram of the checkerboard antiferromagnet”, *Physical Review B*, **72**: 94416 (2005).
- [78] R. G. Melko, A. Paramekanti, A. A. Burkov, A. Vishwanath, D. N. Sheng, and L. Balents, “Supersolid order from disorder: Hard-core bosons on the triangular lattice”, *Physical Review Letters*, **95**: 127207 (2005).
- [79] G. A. Fiete, K. Le Hur, and L. Balents, “Transport in a spin-incoherent Luttinger liquid”, *Physical Review B*, **72**: 125416 (2005).
- [80] L. Balents, L. Bartosch, A. Burkov, S. Sachdev, and K. Senoupta, “Competing orders and non-Landau-Ginzburg-Wilson criticality in (Bose) Mott transitions”, *Progress of Theoretical Physics Supplement*, **160**: 314–336 (2005).
- [81] G. A. Fiete, K. Le Hur, and L. Balents, “Coulomb drag between two spin-incoherent Luttinger liquids”, *Physical Review B*, **73**: 165104 (2006).
- [82] D. L. Bergman, G. A. Fiete, and L. Balents, “Ordering in a frustrated pyrochlore antiferromagnet proximate to a spin liquid”, *Physical Review B*, **73**: 134402 (2006).
- [83] L. Bartosch, L. Balents, and S. Sachdev, “Detecting the quantum zero-point motion of vortices in the cuprate superconductors”, *Annals of Physics*, **321**: 1528–1546 (2006).
- [84] D. L. Bergman, R. Shindou, G. A. Fiete, and L. Balents, “Quantum effects in a half-polarized pyrochlore antiferromagnet”, *Physical Review Letters*, **96**: 97207 (2006).
- [85] D. L. Bergman, R. Shindou, G. A. Fiete, and L. Balents, “Erratum: Quantum effects in a half-polarized pyrochlore antiferromagnet (vol 96, art no 097207, 2006)”, *Physical Review Letters*, **97**: 139906 (2006).
- [86] Doron L. Bergman, Ryuichi Shindou, Gregory A. Fiete, and Leon Balents, “Models of degeneracy breaking in pyrochlore antiferromagnets”, *Physical Review B*, **74**: 134409 (2006).
- [87] R. Shindou and L. Balents, “Artificial electric field in Fermi liquids”, *Physical Review Letters*, **97**: 216601 (2006).
- [88] O. A. Starykh and L. Balents, “Ordering in spatially anisotropic triangular antiferromagnets”, *Physical Review Letters*, **98**: 077205 (2007).
- [89] Doron L. Bergman, Ryuichi Shindou, Gregory A. Fiete, and Leon Balents, “Degenerate

- perturbation theory of quantum fluctuations in a pyrochlore antiferromagnet”, *Physical Review B*, **75**: 094403 (2007).
- [90] Doron L. Bergman, Ryuichi Shindou, Gregory A. Fiete, and Leon Balents, “Effective Hamiltonians for some highly frustrated magnets”, *J. Phys. Condens. Matt.*, **19**: 145204 (2007).
- [91] L. Balents and S. Sachdev, “Dual vortex theory of doped antiferromagnets”, *Ann. Phys.*, **322**: 2635–2664 (2007).
- [92] J. E. Moore and L. Balents, “Topological invariants of time-reversal-invariant band structures”, *Physical Review B*, **75**: 121306 (2007).
- [93] Doron Bergman, Jason Alicea, Emanuel Gull, Simon Trebst, and Leon Balents, “Order by disorder and spiral spin liquid in frustrated diamond lattice antiferromagnets”, *Nature Physics*, **3**: 487–491 (2007).
- [94] Gang Chen, Doron L. Bergman, and Leon Balents, “Semiclassical dynamics and long time asymptotics of the central spin problem”, *Physical Review B*, **76**: 45312 (2007).
- [95] Congjun Wu, Doron Bergman, Leon Balents, and S. Das Sarma, “Flat bands and Wigner crystallization in the honeycomb optical lattice.”, *Phys Rev Lett*, **99**: 070401 (2007).
- [96] L. Sheng, D. N. Sheng, F. D M Haldane, and Leon Balents, “Odd-integer quantum Hall effect in graphene: interaction and disorder effects.”, *Phys Rev Lett*, **99**: 196802 (2007).
- [97] Jie Lou, Anders W Sandvik, and Leon Balents, “Emergence of U(1) symmetry in the 3D XY model with Z_q anisotropy.”, *Phys Rev Lett*, **99**: 207203 (2007).
- [98] Masanori Kohno, Oleg A. Starykh, and Leon Balents, “Spinons and triplons in spatially anisotropic frustrated antiferromagnets”, *Nature Physics*, **3**: 790–795 (2007).
- [99] Ryuichi Shindou and Leon Balents, “Gradient expansion approach to multiple-band Fermi liquids”, *Physical Review B*, **77**: 035110 (2008).
- [100] Gang Chen and Leon Balents, “Spin-orbit effects in $\text{Na}_4\text{Ir}_3\text{O}_8$: A hyper-kagome lattice antiferromagnet”, *Phys. Rev. B*, **78**: 094403 (2008).
- [101] E. A. Stoudenmire and Leon Balents, “Ordered phases of the anisotropic kagome-lattice antiferromagnet in a magnetic field”, *Physical Review B*, **77**: 174414 (2008).
- [102] Doron L. Bergman, Congjun Wu, and Leon Balents, “Band touching from real-space topology in frustrated hopping models”, *Physical Review B*, **78**: 125104 (2008).
- [103] H. C. Jiang, M. Q. Weng, Z. Y. Weng, D. N. Sheng, and L. Balents, “Supersolid order of frustrated hard-core bosons in a triangular lattice system”, *Physical Review B*, **79**: 020409 (2009).
- [104] M.J. Lawler, A. Paramekanti, Y.B. Kim, and L. Balents, “Gapless Spin Liquids on the Three-Dimensional Hyperkagome Lattice of $\text{Na}_4\text{Ir}_3\text{O}_8$ ”, *Physical Review Letters*, **101**: 197202 (2008).
- [105] Andreas P. Schnyder, Oleg A. Starykh, and Leon Balents, “Spatially Anisotropic Heisenberg Kagome Antiferromagnet”, *Phys. Rev. B*, **78**: 174420 (2008).
- [106] S.B. Lee and L. Balents, “Theory of the ordered phase in A-site antiferromagnetic spinels”, *Physical Review B*, **78**: 14 (2008).
- [107] M. Kohno, L. Balents, and O.A. Starykh, “Dynamical properties of spatially anisotropic frustrated Heisenberg models in a magnetic field”, *Journal of Physics: Conference Series*, **145**: 012062 (2009).
- [108] Gang Chen, Leon Balents, and Andreas P. Schnyder, “A Spin-Orbital Singlet and Quantum Critical Point on the Diamond Lattice: FeSc_2S_4 ”, *Physical Review Letters*, **102**:

- 096406 (2009).
- [109] Jason Alicea and Leon Balents, “Bismuth in strong magnetic fields: Unconventional Zeeman coupling and correlation effects”, *Physical Review B (Condensed Matter and Materials Physics)*, **79**: 241101 (2009).
 - [110] B.C. Melot, K. Page, R. Seshadri, EM Stoudenmire, L. Balents, D.L. Bergman, and T. Proffen, “Magnetic frustration on the diamond lattice of the A-site magnetic spinels $\text{CoAl}_2 - x\text{Ga}_x\text{O}_4$: The role of lattice expansion and site disorder”, *Physical Review B*, **80**: 104420 (2009).
 - [111] Gang Chen, Jan Gukelberger, Simon Trebst, Fabien Alet, and Leon Balents, “Coulomb gas transitions in three-dimensional classical dimer models”, *Physical Review B (Condensed Matter and Materials Physics)*, **80**: 045112 (2009).
 - [112] E. M. Stoudenmire, Simon Trebst, and Leon Balents, “Quadrupolar correlations and spin freezing in $S = 1$ triangular lattice antiferromagnets”, *Physical Review B (Condensed Matter and Materials Physics)*, **79**: 214436 (2009).
 - [113] Gang Chen, Andreas P. Schnyder, and Leon Balents, “Excitation spectrum and magnetic field effects in a quantum critical spin-orbital system: The case of FeSc_2S_4 ”, *Physical Review B (Condensed Matter and Materials Physics)*, **80**: 224409 (2009).
 - [114] D. A. Pesin and Leon Balents, “Mott physics and band topology in materials with strong spin-orbit interaction”, *Nature Physics*, **6**: 376–381 (2010).
 - [115] Junwoo Son, Pouya Moetakef, James M. LeBeau, Daniel Ouellette, Leon Balents, S. James Allen, and Susanne Stemmer, “Low-dimensional mott material: transport in ultrathin epitaxial LaNiO_3 films”, *Applied Physics Letters*, **96**: 062114 (2010).
 - [116] SungBin Lee, Ribhu K. Kaul, and Leon Balents, “Interplay of quantum criticality and geometric frustration in columbite”, *Nature Physics*, **6**: 702–706 (2010).
 - [117] Leon Balents, “Spin liquids in frustrated magnets”, *Nature*, **464**: 199–208 (2010).
 - [118] Oleg A. Starykh, Hosho Katsura, and Leon Balents, “Extreme sensitivity of a frustrated quantum magnet: Cs_2CuCl_4 ”, *Phys. Rev. B*, **82**: 014421 (2010).
 - [119] S.B. Lee, R. Chen, and L. Balents, “Landau theory of charge and spin ordering in the nickelates”, *Physical Review Letters*, **106**: 16405 (2011).
 - [120] G. Chen, R. Pereira, and L. Balents, “Exotic phases induced by strong spin-orbit coupling in ordered double perovskites”, *Physical Review B*, **82**: 174440 (2010).
 - [121] Daniel G. Ouellette, SungBin Lee, Junwoo Son, Susanne Stemmer, Leon Balents, Andrew J. Millis, and S. James Allen, “Optical conductivity of LaNiO_3 : coherent transport and correlation driven mass enhancement”, *Phys. Rev. B*, **82**: 165112 (2010).
 - [122] L. Balents and Z.X. Shen, “Correlated electron systems: reaching for the stars”, *Nature Materials*, **9**: 963–964 (2010).
 - [123] Cenke Xu and Leon Balents, “Quantum phase transitions around the staggered valence-bond solid”, *Phys. Rev. B*, **84**: 014402 (2011).
 - [124] Junwoo Son, Bharat Jalan, Adam P. Kaidos, Leon Balents, S. James Allen, and Susanne Stemmer, “Probing the metal-insulator transition of NdNiO_3 by electrostatic doping”, *Applied Physics Letters*, **99**: 192107 (2011).
 - [125] Leon Balents, “Weyl electrons kiss”, *Physics*, **4**: 36 (2011).
 - [126] Lucile Savary, Emanuel Gull, Simon Trebst, Jason Alicea, Doron Bergman, and Leon Balents, “Impurity effects in highly frustrated diamond-lattice antiferromagnets”, *Phys. Rev. B*, **84**: 064438 (2011).

- [127] A. A. Burkov and Leon Balents, “Weyl semimetal in a topological insulator multilayer”, *Phys. Rev. Lett.*, **107**: 127205 (2011).
- [128] Gang Chen and Leon Balents, “Spin-orbit coupling in d^2 ordered double perovskites”, *Phys. Rev. B*, **84**: 094420 (2011).
- [129] SungBin Lee, Ru Chen, and Leon Balents, “Metal-insulator transition in a two-band model for the perovskite nickelates”, *Phys. Rev. B*, **84**: 165119 (2011).
- [130] Kate A. Ross, Lucile Savary, Bruce D. Gaulin, and Leon Balents, “Quantum excitations in quantum spin ice”, *Phys. Rev. X*, **1**: 021002 (2011).
- [131] Gábor B. Halász and Leon Balents, “Time-reversal invariant realization of the weyl semimetal phase”, *Phys. Rev. B*, **85**: 035103 (2012).
- [132] Z.-C. Gu, H.-C. Jiang, D. N. Sheng, H. Yao, L. Balents, and X.-G. Wen, “Time reversal symmetry breaking superconductivity in the honeycomb t-J model”, *ArXiv e-prints*, : (2011).
- [133] Lucile Savary and Leon Balents, “Coulombic quantum liquids in spin-1/2 pyrochlores”, *Phys. Rev. Lett.*, **108**: 037202 (2012).
- [134] A. A. Burkov, M. D. Hook, and Leon Balents, “Topological nodal semimetals”, *Phys. Rev. B*, **84**: 235126 (2011).
- [135] Cenke Xu, Fa Wang, Yang Qi, Leon Balents, and Matthew P. A. Fisher, “Spin liquid phases for spin-1 systems on the triangular lattice”, *Phys. Rev. Lett.*, **108**: 087204 (2012).
- [136] Hong-Chen Jiang, Hong Yao, and Leon Balents, “Spin liquid ground state of the spin-12 square J_1 - J_2 Heisenberg model”, *Phys. Rev. B*, **86**: 024424 (2012).
- [137] Tobias Meng and Leon Balents, “Weyl superconductors”, *Phys. Rev. B*, **86**: 054504 (2012).
- [138] Lucile Savary, Kate A. Ross, Bruce D. Gaulin, Jacob P. C. Ruff, and Leon Balents, “Order by Quantum Disorder in $Er_2Ti_2O_7$ ”, *Phys. Rev. Lett.*, **109**: 167201 (2012).
- [139] SungBin Lee, Shigeki Onoda, and Leon Balents, “Generic quantum spin ice”, *Phys. Rev. B*, **86**: 104412 (2012).
- [140] Leon Balents, “The impact of ionic frustration on electronic order”, *Science*, **336**: 547-548 (2012).
- [141] H.C. Jiang, Z. Wang, and L. Balents, “Identifying topological order by entanglement entropy”, *Nature Physics*, **8**: 902-905 (2012).
- [142] T.A. Cain, S.B. Lee, P. Moetakef, L. Balents, S. Stemmer, and S. James Allen, “Seebeck coefficient of a quantum confined, high-electron-density electron gas in $SrTiO_3$ ”, *Applied Physics Letters*, **100**: 161601-161601 (2012).
- [143] Pouya Moetakef, Daniel G Ouellette, James R Williams, S James Allen, Leon Balents, David Goldhaber-Gordon, and Susanne Stemmer, “Quantum oscillations from a two-dimensional electron gas at a mott/band insulator interface”, *Applied Physics Letters*, **101**: 151604 (2012).
- [144] Pouya Moetakef, Clayton A. Jackson, Jinwoo Hwang, Leon Balents, S. James Allen, and Susanne Stemmer, “Toward an artificial Mott insulator: Correlations in confined high-density electron liquids in $SrTiO_3$ ”, *Phys. Rev. B*, **86**: 201102 (2012).
- [145] Eun-Gook Moon, Cenke Xu, Yong Baek Kim, and Leon Balents, “Non-fermi-liquid and topological states with strong spin-orbit coupling”, *Phys. Rev. Lett.*, **111**: 206401 (2013).
- [146] Michael Lang, Bernd Wolf, Andreas Honecker, Leon Balents, Ulrich Tutsch, Pham Than Cong, Georg Hofmann, Natalia Krüger, Franz Ritter, Wolf Assmus, and Andrey

- Prokofiev, “Field-induced quantum criticality – application to magnetic cooling”, *physica status solidi (b)*, **250**: 457–463 (2013).
- [147] Ru Chen, Hyejin Ju, Hong-Chen Jiang, Oleg A. Starykh, and Leon Balents, “Ground states of spin-12 triangular antiferromagnets in a magnetic field”, *Phys. Rev. B*, **87**: 165123 (2013).
- [148] Ru Chen, SungBin Lee, and Leon Balents, “Dimer mott insulator in an oxide heterostructure”, *Phys. Rev. B*, **87**: 161119 (2013).
- [149] Hyejin Ju and Leon Balents, “Finite-size effects in the Z_2 spin liquid on the kagome lattice”, *Phys. Rev. B*, **87**: 195109 (2013).
- [150] Wing-Ho Ko, Hong-Chen Jiang, Jeffrey G. Rau, and Leon Balents, “Ordering and criticality in an underscreened kondo chain”, *Phys. Rev. B*, **87**: 205107 (2013).
- [151] Gang Chen and Leon Balents, “Ferromagnetism in itinerant two-dimensional t_{2g} systems”, *Phys. Rev. Lett.*, **110**: 206401 (2013).
- [152] Hong-Chen Jiang, Rajiv R. P. Singh, and Leon Balents, “Accuracy of topological entanglement entropy on finite cylinders”, *Phys. Rev. Lett.*, **111**: 107205 (2013).
- [153] Lucile Savary and Leon Balents, “Spin liquid regimes at nonzero temperature in quantum spin ice”, *Phys. Rev. B*, **87**: 205130 (2013).
- [154] William Witczak-Krempa, Gang Chen, Yong-Baek Kim, and Leon Balents, “Correlated quantum phenomena in the strong spin-orbit regime”, *Annual Review of Condensed Matter Physics*, **5**: 57–82 (2014).
- [155] Zheng-Cheng Gu, Hong-Chen Jiang, D. N. Sheng, Hong Yao, Leon Balents, and Xiao-Gang Wen, “Time-reversal symmetry breaking superconducting ground state in the doped mott insulator on the honeycomb lattice”, *Phys. Rev. B*, **88**: 155112 (2013).
- [156] Lucile Savary, Eun-Gook Moon, and Leon Balents, “New type of quantum criticality in the pyrochlore iridates”, *Phys. Rev. X*, **4**: 041027 (2014).
- [157] Jack Y. Zhang, Clayton A. Jackson, Ru Chen, Santosh Raghavan, Pouya Moetakef, Leon Balents, and Susanne Stemmer, “Correlation between metal-insulator transitions and structural distortions in high-electron-density SrTiO_3 quantum wells”, *Phys. Rev. B*, **89**: 075140 (2014).
- [158] Oleg A. Starykh and Leon Balents, “Excitations and quasi-one-dimensionality in field-induced nematic and spin density wave states”, *Phys. Rev. B*, **89**: 104407 (2014).
- [159] Xiaopeng Li, W. Vincent Liu, and Leon Balents, “Spirals and skyrmions in two dimensional oxide heterostructures”, *Phys. Rev. Lett.*, **112**: 067202 (2014).
- [160] Teng-Teng Zhu, Wei Sun, Ya-Xi Huang, Zhi-Mei Sun, Yuanming Pan, Leon Balents, and Jin-Xiao Mi, “Strong spin frustration from isolated triangular Cu(II) trimers in $\text{SrCu(OH)}_3\text{Cl}$ with a novel cuprate layer”, *J. Mater. Chem. C*, **2**: 8170–8178 (2014).
- [161] Leon Balents, “Energy density of variational states”, *Phys. Rev. B*, **90**: 245116 (2014).
- [162] Hiroaki Ishizuka and Leon Balents, “Magnetism in $s = 12$ double perovskites with strong spin-orbit interactions”, *Phys. Rev. B*, **90**: 184422 (2014).
- [163] L. Mittelstädt, M. Schmidt, Zhe Wang, F. Mayr, V. Tsurkan, P. Lunkenheimer, D. Ish, L. Balents, J. Deisenhofer, and A. Loidl, “Spin-orbiton and quantum criticality in FeSc_2S_4 ”, *Phys. Rev. B*, **91**: 125112 (2015).
- [164] Shou-Shu Gong, Wei Zhu, Leon Balents, and D. N. Sheng, “Global phase diagram of competing ordered and quantum spin-liquid phases on the kagome lattice”, *Phys. Rev. B*, **91**: 075112 (2015).

- [165] Chuck-Hou Yee and Leon Balents, “Phase separation in doped mott insulators”, *Phys. Rev. X*, **5**: 021007 (2015).
- [166] S. James Allen, Adam J. Hauser, Evgeny Mikheev, Jack Y. Zhang, Nelson E. Moreno, Junwoo Son, Daniel G. Ouellette, James Kally, Alex Kozhanov, Leon Balents, and Susanne Stemmer, “Gaps and pseudogaps in perovskite rare earth nickelates”, *APL Materials*, **3**: - (2015).
- [167] Hiroaki Ishizuka and Leon Balents, “Switching of magnetic anisotropy in a fcc antiferromagnet with direction-dependent interactions”, *Phys. Rev. B*, **92**: 020411 (2015).
- [168] Robert-Jan Slager, Louk Rademaker, Jan Zaanen, and Leon Balents, “Impurity-bound states and green’s function zeros as local signatures of topology”, *Phys. Rev. B*, **92**: 085126 (2015).
- [169] Jason Iaconis and Leon Balents, “Many-body effects in topological kondo insulators”, *Phys. Rev. B*, **91**: 245127 (2015).
- [170] James M. Murray, Oskar Vafek, and Leon Balents, “Incommensurate spin density wave at a ferromagnetic quantum critical point in a three-dimensional parabolic semimetal”, *Phys. Rev. B*, **92**: 035137 (2015).
- [171] Daniel Ish and Leon Balents, “Theory of excitations and dielectric response at a spin-orbital quantum critical point”, *Phys. Rev. B*, **92**: 094413 (2015).
- [172] Takeshi Kondo, M. Nakayama, R. Chen, J. J. Ishikawa, E. -G. Moon, T. Yamamoto, Y. Ota, W. Malaeb, H. Kanai, Y. Nakashima, Y. Ishida, R. Yoshida, H. Yamamoto, M. Matsunami, S. Kimura, N. Inami, K. Ono, H. Kumigashira, S. Nakatsuji, L. Balents, and S. Shin, “Quadratic fermi node in a 3d strongly correlated semimetal”, *Nature communications*, **6**: 10042 (2015).
- [173] S. Nemšák, G. Conti, G. K. Palsson, C. Conlon, S. Cho, J. E. Rault, J. Avila, M.-C. Asensio, C. A. Jackson, P. Moetafak, A. Janotti, L. Bjaalie, B. Himmetoglu, C. G. Van de Walle, L. Balents, C. M. Schneider, S. Stemmer, and C. S. Fadley, “Observation by resonant angle-resolved photoemission of a critical thickness for 2-dimensional electron gas formation in srtio₃ embedded in gdtio₃”, *Applied Physics Letters*, **107**: 231602 (2015).
- [174] Zhaoming Tian, Yoshimitsu Kohama, Takahiro Tomita, Hiroaki Ishizuka, Timothy H. Hsieh, Jun J. Ishikawa, Koichi Kindo, Leon Balents, and Satoru Nakatsuji, “Field-induced quantum metal-insulator transition in the pyrochlore iridate Nd₂Ir₂O₇”, *Nat Phys*, **12**: 134–138 (2016).
- [175] S Nemšák, G Conti, GK Palsson, C Conlon, S Cho, JE Rault, J Avila, M-C Asensio, CA Jackson, P Moetafak, and others, “Observation by resonant angle-resolved photoemission of a critical thickness for 2-dimensional electron gas formation in srtio₃ embedded in gdtio₃”, *Applied physics letters*, **107**: 231602 (2015).
- [176] Evgeny Mikheev, Santosh Raghavan, Jack Y. Zhang, Patrick B. Marshall, Adam P. Kaldos, Leon Balents, and Susanne Stemmer, “Carrier density independent scattering rate in srtio₃-based electron liquids”, *Scientific Reports*, **6**: 20865 (2016).
- [177] Timothy H. Hsieh, Hiroaki Ishizuka, Leon Balents, and Taylor L. Hughes, “Bulk topological proximity effect”, *Phys. Rev. Lett.*, **116**: 086802 (2016).
- [178] Leon Balents and Oleg A. Starykh, “Quantum lifshitz field theory of a frustrated ferromagnet”, *Phys. Rev. Lett.*, **116**: 177201 (2016).
- [179] Jason Iaconis, Hiroaki Ishizuka, D. N. Sheng, and Leon Balents, “Kinetic magnetism at

- the interface between mott and band insulators”, *Phys. Rev. B*, **93**: 155144 (2016).
- [180] Lucile Savary and Leon Balents, “Quantum spin liquids: a review”, *Reports on Progress in Physics*, **80**: 016502 (2017).
- [181] Rina Takashima, Hiroaki Ishizuka, and Leon Balents, “Quantum skyrmions in two-dimensional chiral magnets”, *Physical Review B*, **94**: 134415 (2016).
- [182] Louk Rademaker, Zohar Nussinov, Leon Balents, and Vladimir Dobrosavljevic, “Absence of marginal stability in self-generated coulomb glasses”, *arXiv preprint arXiv:1605.01822*, : (2016).
- [183] Lucile Savary and Leon Balents, “Disorder-induced quantum spin liquid in spin ice pyrochlores”, *Phys. Rev. Lett.*, **118**: 087203 (2017).
- [184] Shou-Shu Gong, Wei Zhu, Kun Yang, Oleg A. Starykh, D. N. Sheng, and Leon Balents, “Emergent quasi-one-dimensionality in a kagome magnet: a simple route to complexity”, *Phys. Rev. B*, **94**: 035154 (2016).
- [185] M. Nakayama, Takeshi Kondo, Z. Tian, J. J. Ishikawa, M. Halim, C. Bareille, W. Malaeb, K. Kuroda, T. Tomita, S. Ideta, K. Tanaka, M. Matsunami, S. Kimura, N. Inami, K. Ono, H. Kumigashira, L. Balents, S. Nakatsuji, and S. Shin, “Slater to mott crossover in the metal to insulator transition of $Nd_2Ir_2O_7$ ”, *Phys. Rev. Lett.*, **117**: 056403 (2016).
- [186] S. Nemšák, G. Conti, A. X. Gray, G. K. Palsson, C. Conlon, D. Eiteneer, A. Keqi, A. Rattanachata, A. Y. Saw, A. Bostwick, L. Moreschini, E. Rotenberg, V. N. Strocov, M. Kobayashi, T. Schmitt, W. Stolte, S. Ueda, K. Kobayashi, A. Gloskovskii, W. Drube, C. A. Jackson, P. Moetakef, A. Janotti, L. Bjaalie, B. Himmetoglu, C. G. Van de Walle, S. Borek, J. Minar, J. Braun, H. Ebert, L. Plucinski, J. B. Kortright, C. M. Schneider, L. Balents, F. M. F. de Groot, S. Stemmer, and C. S. Fadley, “Energetic, spatial, and momentum character of the electronic structure at a buried interface: the two-dimensional electron gas between two metal oxides”, *Phys. Rev. B*, **93**: 245103 (2016).
- [187] Xue-Yang Song, Yi-Zhuang You, and Leon Balents, “Low-energy spin dynamics of the honeycomb spin liquid beyond the kitaev limit”, *Phys. Rev. Lett.*, **117**: 037209 (2016).
- [188] Julia Röchner, Leon Balents, and Kai Phillip Schmidt, “Spin liquid and quantum phase transition without symmetry breaking in a frustrated three-dimensional ising model”, *Phys. Rev. B*, **94**: 201111 (2016).
- [189] Leon Balents, “Condensed-matter physics: quantum mechanics in a spin”, *Nature*, **540**: 534–535 (2016).
- [190] Fei-Ye Li, Yao-Dong Li, Yong Baek Kim, Leon Balents, Yue Yu, and Gang Chen, “Weyl magnons in breathing pyrochlore antiferromagnets”, *Nature Communications*, **7**: 12691 (2016).
- [191] Jianpeng Liu and Leon Balents, “Correlation effects and quantum oscillations in topological nodal-loop semimetals”, *Phys. Rev. B*, **95**: 075426 (2017).
- [192] Edward Parker and Leon Balents, “Semiclassical analysis of a magnetization plateau in a two-dimensional frustrated ferrimagnet”, *Phys. Rev. B*, **95**: 104411 (2017).
- [193] Judit Romhányi, Leon Balents, and George Jackeli, “Spin-orbit dimers and noncollinear phases in d^1 cubic double perovskites”, *Phys. Rev. Lett.*, **118**: 217202 (2017).
- [194] Zhen Bi, Ruixing Zhang, Yi-Zhuang You, Andrea Young, Leon Balents, Chao-Xing Liu, and Cenke Xu, “Bilayer graphene as a platform for bosonic symmetry-protected topological states”, *Phys. Rev. Lett.*, **118**: 126801 (2017).
- [195] Xue-Yang Song, Chao-Ming Jian, and Leon Balents, “Strongly correlated metal built

- from sachdev-ye-kitaev models”, *Phys. Rev. Lett.*, **119**: 216601 (2017).
- [196] Tobias Meng and Leon Balents, “Erratum: weyl superconductors [phys. rev. b 86, 054504 (2012)]”, *Phys. Rev. B*, **96**: 019901 (2017).
- [197] Jianpeng Liu and Leon Balents, “Anomalous hall effect and topological defects in anti-ferromagnetic weyl semimetals: Mn_3Sn/Ge ”, *Phys. Rev. Lett.*, **119**: 087202 (2017).
- [198] Gábor B. Halász, Timothy H. Hsieh, and Leon Balents, “Fracton topological phases from strongly coupled spin chains”, *Phys. Rev. Lett.*, **119**: 257202 (2017).
- [199] N. Blanc, J. Trinh, L. Dong, X. Bai, A. A. Aczel, M. Mourigal, L. Balents, T. Siegrist, and A. P. Ramirez, “Quantum criticality among entangled spin chains”, *Nature Physics*, : (2017).
- [200] Jason Iaconis, Chunxiao Liu, Gábor B. Halász, and Leon Balents, “Spin Liquid versus Spin Orbit Coupling on the Triangular Lattice”, *SciPost Phys.*, **4**: 003 (2018).
- [201] Louk Rademaker, Zohar Nussinov, Leon Balents, and Vladimir Dobrosavljević, “Suppressed density of states in self-generated coulomb glasses”, *New Journal of Physics*, **20**: 043026 (2018).
- [202] Edward Parker and Leon Balents, “Finite-temperature behavior of a classical spin-orbit-coupled model for $YbMgGaO_4$ with and without bond disorder”, *Phys. Rev. B*, **97**: 184413 (2018).
- [203] Rebecca L. Dally, Yang Zhao, Zhijun Xu, Robin Chisnell, M. B. Stone, Jeffrey W. Lynn, Leon Balents, and Stephen D. Wilson, “Amplitude mode in the planar triangular anti-ferromagnet $Na_{0.9}MnO_2$ ”, *Nature Communications*, **9**: 2188 (2018).
- [204] Jianpeng Liu, Kasra Hejazi, and Leon Balents, “Floquet engineering of multiorbital mott insulators: applications to orthorhombic titanates”, *Phys. Rev. Lett.*, **121**: 107201 (2018).
- [205] Mengxing Ye, Gábor B. Halász, Lucile Savary, and Leon Balents, “Quantization of the thermal hall conductivity at small hall angles”, *Phys. Rev. Lett.*, **121**: 147201 (2018).
- [206] Cenke Xu and Leon Balents, “Topological superconductivity in twisted multilayer graphene”, *Phys. Rev. Lett.*, **121**: 087001 (2018).
- [207] Kasra Hejazi, Chunxiao Liu, Hassan Shapourian, Xiao Chen, and Leon Balents, “Multiple topological transitions in twisted bilayer graphene near the first magic angle”, *Phys. Rev. B*, **99**: 035111 (2019).
- [208] Chunxiao Liu, Xiao Chen, and Leon Balents, “Quantum entanglement of the sachdev-ye-kitaev models”, *Phys. Rev. B*, **97**: 245126 (2018).